

Amendments to the Claims:

Claims 1-32 were pending in this application. Please cancel claims 4, 17, and 28, and amend claims 1, 5, 6, 8, 10, 13, 15, 18, 19, 25, 29, and 30, without prejudice, as follow:

- 1 1. (currently amended) A virtual storage system comprising:
2 a computing device accessing virtual storage;
3 a plurality of physical storage devices; and
4 a controller in communication with the computing device and the
5 plurality of physical storage, the controller operative to
6 (a) receive a virtual storage access request from the computing
7 device specifying a virtual data access, the virtual data access
8 comprising a plurality of blocks, each of the plurality of blocks
9 associated with one of at least two target physical storage
10 devices, the target physical storage devices comprising at least
11 a subset of the plurality of physical storage devices;
12 (b) determine an access sequence associating one target storage
13 device with each block in the received virtual storage access
14 request;
15 (c) send at least one physical access request to each target storage
16 device;
17 (d) receive at least one error message from at least one target
18 storage device, each error message having an error type; and
19 (e) determine an error response based on the error message type
20 and on the access sequence, the error response determination
21 including terminating each physical access request
22 corresponding to a block in the access sequence later than a
23 problematic block, the problematic block one of the plurality
24 of blocks an attempted access of which generates at least one
25 error message.

1 2. (original) A virtual storage system as in claim 1 wherein received
2 error message types comprise communication error and access error.

1 3. (original) A virtual storage system as in claim 1 wherein the
2 determined error response comprises terminating the virtual storage access if the
3 received error type comprises a communication error.

1 4. (canceled).

1 5. (currently amended) A virtual storage system as in claim 1 ~~claim~~
2 ~~4~~ wherein the virtual storage access comprises a read operation from the computing
3 device, the controller returning to the computing device blocks in the access sequence
4 prior to the problematic block.

1 6. (currently amended) A virtual storage system ~~as in claim 1~~
2 comprising:
3 a computing device accessing virtual storage;
4 a plurality of physical storage devices; and
5 a controller in communication with the computing device and the
6 plurality of physical storage, the controller operative to
7 (a) receive a virtual storage access request from the computing
8 device specifying a virtual data access, the virtual data access
9 comprising a plurality of blocks, each of the plurality of blocks
10 associated with one of at least two target physical storage
11 devices, the target physical storage devices comprising at least
12 a subset of the plurality of physical storage devices;
13 (b) determine an access sequence associating one target storage
14 device with each block in the received virtual storage access
15 request;

- 16 (c) send at least one physical access request to each target storage
17 device;
18 (d) receive at least one error message from at least one target
19 storage device, each error message having an error type; and
20 (e) determine an error response based on the error message type
21 and on the access sequence;
22 wherein the determined error response comprises terminating each
23 physical access request corresponding to a block in the access sequence later than a
24 problematic block, the problematic block one of the plurality of blocks an attempted
25 access of which generates a communication error.

1 7. (original) A virtual storage system as in claim 6 further comprising
2 returning an indication of an access error to the computing device.

- 1 8. (currently amended) A virtual storage system ~~as in claim 1~~
2 comprising:
3 a computing device accessing virtual storage;
4 a plurality of physical storage devices; and
5 a controller in communication with the computing device and the
6 plurality of physical storage, the controller operative to
7 (a) receive a virtual storage access request from the computing
8 device specifying a virtual data access, the virtual data access
9 comprising a plurality of blocks, each of the plurality of blocks
10 associated with one of at least two target physical storage
11 devices, the target physical storage devices comprising at least
12 a subset of the plurality of physical storage devices;
13 (b) determine an access sequence associating one target storage
14 device with each block in the received virtual storage access
15 request;

16 (c) send at least one physical access request to each target storage
17 device;
18 (d) receive at least one error message from at least one target
19 storage device, each error message having an error type; and
20 (e) determine an error response based on the error message type
21 and on the access sequence;
22 wherein the determined error response comprises terminating each
23 physical access request corresponding to a block in the access sequence later than a
24 problematic block, the problematic block one of the plurality of blocks an attempted
25 access of which generates an access error.

1 9. (original) A virtual storage system as in claim 1 wherein the error
2 response includes an indication of the first block in the access sequence the access of
3 which generates an error message.

1 10. (currently amended) A method of servicing a virtual storage
2 request placed by a computing device, the virtual storage request specifying a
3 plurality of blocks, the blocks distributed between at least two physical target storage
4 devices, the method comprising:
5 determining an access sequence associating one target storage device
6 with each block in the virtual storage request;
7 sending at least one physical access request to each target storage
8 device;
9 receiving at least one error message, each error message sent from one
10 target storage device, each error message having one of a plurality of error types; and
11 determining an error response based on the error type for at least one
12 error message and on the access sequence, wherein a first problematic block in the
13 access sequence is determined as the first occurring block in the access sequence the
14 attempted access of which returned an error message and an indication of the first

15 problematic block is returned to the computing device placing the virtual storage
16 request.

1 11. (original) A method of servicing a virtual storage request as in
2 claim 10 wherein the error types comprise a communication error and an access
3 error.

1 12. (original) A method of servicing a virtual storage request as in
2 claim 10 wherein the error message has a communication error type indicating the
3 target storage device sending the error message is unavailable, the error response
4 comprising terminating each physical access request for all target storage devices.

1 13. (currently amended) A method of servicing a virtual storage
2 request as in claim 10 placed by a computing device, the virtual storage request
3 specifying a plurality of blocks, the blocks distributed between at least two physical
4 target storage devices, the method comprising:
5 determining an access sequence associating one target storage device
6 with each block in the virtual storage request;
7 sending at least one physical access request to each target storage
8 device;
9 receiving at least one error message, each error message sent from one
10 target storage device, each error message having one of a plurality of error types; and
11 determining an error response based on the error type for at least one
12 error message and on the access sequence;
13 wherein the error message has an access error type indicating the
14 target storage device cannot access a problematic block, the error response
15 comprising terminating each physical access request for any block in the access
16 sequence after the problematic block.

1 14. (original) A method of servicing a virtual storage request as in
2 claim 13 wherein the virtual storage request is a read request, the error response
3 further comprising sending to the computing device all blocks in the access sequence
4 before the problematic block.

1 15. (currently amended) A method of servicing a virtual storage
2 request ~~as in claim 10~~ placed by a computing device, the virtual storage request
3 specifying a plurality of blocks, the blocks distributed between at least two physical
4 target storage devices, the method comprising:
5 determining an access sequence associating one target storage device
6 with each block in the virtual storage request;
7 sending at least one physical access request to each target storage
8 device;
9 receiving at least one error message, each error message sent from one
10 target storage device, each error message having one of a plurality of error types; and
11 determining an error response based on the error type for at least one
12 error message and on the access sequence;
13 wherein the error message has a communications error type, the error
14 response comprising terminating each physical access request for any block in the
15 access sequence after the problematic block.

1 16. (original) A method of servicing a virtual storage request as in
2 claim 15 wherein the virtual storage request is a read request, the error response
3 further comprising sending to the computing device all blocks in the access sequence
4 before the problematic block.

1 17. (canceled).

1 18. (currently amended) A method of servicing a virtual storage
2 request ~~as in claim 10~~ placed by a computing device, the virtual storage request

3 specifying a plurality of blocks, the blocks distributed between at least two physical
4 target storage devices, the method comprising:
5 determining an access sequence associating one target storage device
6 with each block in the virtual storage request;
7 sending at least one physical access request to each target storage
8 device;
9 receiving at least one error message, each error message sent from one
10 target storage device, each error message having one of a plurality of error types; and
11 determining an error response based on the error type for at least one
12 error message and on the access sequence, wherein determining the error response
13 includes
14 ~~wherein determining an error response comprises:~~
15 determining as a first problematic block the first block in the access
16 sequence the access attempt of which generated an error message;
17 determining the error type for the first problematic block; and
18 forwarding the determined error type to the computing device placing
19 the virtual storage request.

1 19. (currently amended) A method of servicing a virtual storage
2 request ~~as in claim 10~~ placed by a computing device, the virtual storage request
3 specifying a plurality of blocks, the blocks distributed between at least two physical
4 target storage devices, the method comprising:
5 determining an access sequence associating one target storage device
6 with each block in the virtual storage request;
7 sending at least one physical access request to each target storage
8 device;
9 receiving at least one error message, each error message sent from one
10 target storage device, each error message having one of a plurality of error types; and

11 determining an error response based on the error type for at least one
12 error message and on the access sequence, wherein determining the error response
13 includes
14 ~~wherein determining an error response comprises:~~
15 determining as a first problematic block the first block in the access
16 sequence the access attempt of which generated an error message;
17 determining the error type for the first problematic block as a
18 communication error; and
19 forwarding an access error type message to the computing device
20 placing the virtual storage request.

1 20. (original) A method of servicing a virtual storage request placed
2 to a virtual storage device, the virtual storage request comprising a logical sequence
3 of a plurality of blocks stored on a plurality of physical storage devices, the physical
4 storage devices comprising the virtual storage device, the method comprising:
5 placing at least one physical storage request to each of the plurality of
6 physical storage devices, each physical storage request requesting access to at least
7 one of the plurality of blocks stored on the physical storage device targeted by the
8 physical storage request;
9 receiving a response from each targeted physical storage device
10 corresponding to each physical storage request, each response comprising a
11 successful response or an error response, the error response indicating an error type;
12 for each error response, determining if the error type is an access
13 error, the access error indicating the targeted physical storage device could not access
14 a problematic block, the problematic block requested in the corresponding physical
15 storage request; and
16 if the error type is an access error, canceling all active physical storage
17 requests later in the logical sequence than the problematic block.

1 21. (original) A method of servicing a virtual storage request as in
2 claim 20 further comprising canceling all active physical storage requests if the error
3 type is a communication error indicating the targeted physical storage device
4 receiving the corresponding physical storage request is unavailable.

1 22. (original) A method of servicing a virtual storage request as in
2 claim 20 further comprising canceling any active physical storage requests later in the
3 logical sequence then the problematic block if the error type is a communication error
4 indicating the targeted physical storage device receiving the corresponding physical
5 storage request is unavailable.

1 23. (original) A method of servicing a virtual storage request as in
2 claim 20 wherein the virtual storage request comprises a read request, the method
3 further comprising forwarding to a computing device placing the virtual storage
4 request all blocks in the logical sequence prior to the problematic block.

1 24. (original) A method of servicing a virtual storage request as in
2 claim 20 further comprising returning an error indication comprising an indication
3 of a first problematic block, the first problematic block being the first block in the
4 logical sequence the access of which generates an error response.

1 25. (currently amended) A virtual storage system comprising:
2 a plurality of physical storage devices, each physical storage device
3 storing information as a plurality of blocks, each physical storage device responding
4 to a failed physical access request with an error message having one of a plurality of
5 error types; and
6 a controller responding to a virtual storage request for a sequence of
7 blocks stored on at least two of the physical storage devices, the controller operative
8 to

- 9 (a) determine an access sequence associating one physical storage
10 device with each block in the virtual storage request,
11 (b) send at least one physical access request to each physical
12 storage device listed in the access sequence,
13 (c) receive at least one error message from at least one of the
14 physical storage devices in the access sequence, and
15 (d) determine an error response based on the error type for at least
16 one error message and on the access sequence;
17 wherein a received error message has an access error type indicating
18 the physical storage device sending the received error message cannot access a
19 problematic block, each physical access request for any block in the access sequence
20 after the problematic block terminated by the controller.

1 26. (original) A virtual storage system as in claim 25 wherein the
2 error types comprise a communication error and an access error.

1 27. (original) A virtual storage system as in claim 25 wherein at least
2 one received error message has a communication error type, each physical access
3 request for all physical storage devices in the access sequence terminated by the
4 controller.

1 28. (canceled).

1 29. (currently amended) A virtual storage system as in claim ~~25~~
2 ~~28~~ wherein the virtual storage request comprises a read request, the controller further
3 returning all blocks in the access sequence before the problematic block in response
4 to the virtual storage request.

1 30. (currently amended) A virtual storage system ~~as in claim 25~~
2 comprising:

3 a plurality of physical storage devices, each physical storage device
4 storing information as a plurality of blocks, each physical storage device responding
5 to a failed physical access request with an error message having one of a plurality of
6 error types; and

7 a controller responding to a virtual storage request for a sequence of
8 blocks stored on at least two of the physical storage devices, the controller operative
9 to

10 (a) determine an access sequence associating one physical storage
11 device with each block in the virtual storage request,

12 (b) send at least one physical access request to each physical
13 storage device listed in the access sequence,

14 (c) receive at least one error message from at least one of the
15 physical storage devices in the access sequence, and

16 (d) determine an error response based on the error type for at least
17 one error message and on the access sequence;

18 wherein a received error message has a communication error type,
19 each physical access request for any block in the access sequence after the
20 problematic block terminated by the controller.

1 31. (original) A virtual storage system as in claim 30 wherein the
2 virtual storage request comprises a read request, the controller further returning all
3 blocks in the access sequence before the problematic block in response to the virtual
4 storage request.

1 32. (original) A virtual storage controller for servicing a virtual
2 storage request placed to a virtual storage device, the virtual storage request
3 comprising a logical sequence of a plurality of blocks stored on a plurality of physical
4 storage devices, the virtual storage controller cancelling any requests to access blocks
5 later in the logical sequence than a problematic block the access of which generated

- 6 an access error, the virtual storage controller cancelling all requests to access blocks
- 7 after receiving a communication error from any physical storage device.